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RECENT CAVE EXPLORATION IN CALIFORNIA¹

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INTRODUCTION

During the last three years a series of investigations has been carried on by the Department of Anthropology of the University of California, with a view to determining, if possible, the time when man first appeared in this region. As cavern deposits have furnished some of the most important materials in the study of early man in other regions, it was considered desirable, as one of the phases of this work, to make a careful paleontological and archeological investigation of the numerous limestone caves of the state. In this study the effort has been made to obtain as complete a knowledge as possible of the mammalian faunas which have existed in this region between early Quaternary time and the present. Man is considered as a possible element of the fauna, and so far as his geographic or his geologic occurrence is concerned he must be subjected to investigations of much the same character as are used in the study of other organisms. Until the facts of this class are determined, it is difficult to make a beginning on matters which are perhaps more definitely anthropological.

The discovery of human relics, apparently in association with remains belonging to a Quaternary fauna, in the extreme southern portion of South America leads one to suspect that an early migration of the human type may have passed over North America into

¹ Read at the meeting of the American Anthropological Association, San Francisco, August 30, 1905. Including a partial report to the American Committee of the Archaeological Institute of America on the explorations made under an appropriation by the committee for the work in 1905.

South America. That other mammalian types came into America in fairly recent geological time we know, and there is no inherent improbability in the theory that man came with the other mammals. If his remains are found with a Quaternary fauna in the southern continent there is good reason why we should search for them here.

Up to the present time only a few caves situated in Calaveras county and in Shasta county have been examined. Many other occurrences are known, but limitations of time have made it impossible to visit these localities. One would hardly be justified in stating that as yet more than a beginning has been made on the possible cave investigations of California. It is to be hoped that in time these studies, in connection with the other phases of this work, may give us some definite information regarding the date of man's appearance in the Pacific Coast region.

MERCER'S CAVE

In the summer of 1901 Professor F. W. Putnam and the writer examined several caves in the vicinity of Murphys, Calaveras county, and in 1902 Dr W. J. Sinclair visited a number of caverns in the same region. The most interesting remains encountered were those in the well-known Mercer's cave near Murphys. In this cavern there were found a number of bones of an extinct ground-sloth, which has recently been described by Dr Sinclair as the type of a new species, *Megalonyx sierrensis*.¹ The bones of this animal were covered with a deposit of stalagmite, ranging from a few millimeters to about half an inch in thickness. From their situation it appeared that the body of the animal had fallen into the main chute of the cave, and in the process of decay the remains had been scattered for a considerable distance along the passageway. In the same cavern, although not in close proximity to the *Megalonyx* remains, there were found a number of human bones bearing a very thin calcareous incrustation. It appears that in this region it has been at some time the custom of the aborigines to throw the bodies of their dead into such caverns as this, and in places great numbers of skeletons

¹ Wm. J. Sinclair, New Mammalia from the Quaternary Caves of California, *Publ. Univ. Calif.*, Geology, vol. 4, no. 7, p. 155.

have accumulated. The human bones found in this cave were in such position as to indicate that they had been thrown into the first chamber through the small opening above, while the *Megalonyx* remains had fallen some distance below this chamber. While it is exceedingly difficult to form any estimate of the relative ages of the human bones and the *Megalonyx* remains, such evidence as we have seems to indicate that the remains of man are the younger, as they are nearer the opening and are covered with a much thinner layer of stalagmitic material. The human bones are, however, probably many years old. While the relative thickness of the covering of stalagmite is in itself no absolute criterion as to the age of the enclosed material, as it may accumulate very rapidly in one place and very slowly in another place, it is probable that the thinner layer on the human bones means a shorter period of entombment.

POTTER CREEK CAVE

The most extensive investigations of the caverns have been carried on in Shasta county. In this region two large caves have been very carefully explored and the principal deposits almost completely worked over. These are Potter Creek cave, on the McCloud river, near Baird, and the Samwel cave, on the same river, fifteen miles above Baird.

Potter Creek cave was the first to be the subject of careful investigation. It was discovered in 1878 by Mr J. A. Richardson, and by him several specimens of fossil bones were sent to Professor E. D. Cope. In the summer of 1902 Mr E. L. Furlong explored the cave again, without knowing that it was the one discovered by Mr Richardson. Large deposits of fossil remains were found, and excavation work was carried on by him and by Dr Sinclair through that season. Throughout the whole of the summer of 1903 the work was in charge of Dr Sinclair, whose excellent report¹ on this work has already been published. The floor of the cave was carefully surveyed and all specimens taken out were labeled with reference to their position in the strata. The deposits were excavated to a depth of 25 feet, below which there seemed to be little but an

¹ *Publ. Univ. Calif.*, North Amer. Archæol. and Ethnol., vol. 2, no. 1.

accumulation of stalagmite-covered boulders. The exploration work furnished several thousand bones and fragments, of which between 4,000 and 5,000 were determinable specimens. The remains include those of many extinct animals, and furnish the most satisfactory representation of the Quaternary fauna of California that has yet been obtained in any one locality. Fifty-two species were listed by Dr Sinclair, of which at least twenty-one were found to be extinct.

Associated with the remains of the Quaternary fauna in Potter Creek cave there were many broken, splintered, and polished bones, which were carefully investigated by Dr Sinclair, having been considered as possibly representing the work of man. The presence of the splintered bones is yet to be thoroughly satisfactorily explained, though there are many ways in which they might have been formed or introduced. In the caves of Europe such splintered bones are in part due to the splintering of long-bones of large mammals by man, and in part to the crushing of such bones by the larger carnivores.

The character of the pointed and polished bones figured by Dr Sinclair in his paper is also difficult to determine with certainty. These polished fragments strongly resemble many of the roughest implements found in the deposits of the shell-mounds of the Pacific coast. Possibly they have been rough bone splinters, used by man until they attained the degree of polish which we find upon them. On the other hand it is noted that in nearly all shell-mound fragments the polish is mainly upon the pointed portion of the implement, while the portions not used for active work may be almost without smoothing or polish. In the specimens from the caves the polish is almost perfectly even over the whole surface in every case. The evenness of this polish seems to indicate that, if these objects were used as implements, special pains must have been taken to polish those portions which would in the course of ordinary use be left rough. Such smoothing as we see here may perhaps be as readily explained by the action of water as by any other means, the fragments being rubbed on all sides and evenly polished.

In other bone fragments, peculiar perforations and notches have been noted which are not easily explained by the operation of

natural processes, but which could be accounted for by perforation through human agency. Of all the evidence which has been advanced in favor of the influence of man in the production of implement-like objects found in the Shasta caves, the evidence of perforation seems probably the strongest. A serious doubt must exist, however, as to whether the presence of only a few somewhat indefinite perforations in a very small number out of several thousand of these fragments should be considered proof of the presence of man. Had a large percentage of the fragments been formed and used by man, evidence of a more definite character ought to be present in abundance.

While it is probably true that as yet no unequivocal evidence of the agency of man in the fashioning of the bone fragments from this cave has been presented, in all fairness to those who may undertake from the study of such materials to give us something of the earliest history of the human race, we should not forget that, at the very period where the discrimination between artifacts and natural objects is most important it becomes most difficult. In the early stages of the development of man, such implements as were used by him were probably in many cases simply special forms of natural objects which were, in their original form, well adapted to meet his primitive needs. The earliest true artifacts were objects of this class showing only a little modification.

A more detailed discussion of the peculiarly marked bone fragments from the California caves is presented by Professor F. W. Putnam in a paper on this subject appearing also in this number of the *American Anthropologist*.

SAMWEL CAVE

The exploration of the Samwel cave, in the Shasta region, has been carried on by Mr E. L. Furlong through parts of the seasons 1903, 1904, and 1905.¹ This cave is somewhat larger than the one at Potter creek and contains several chambers of considerable size. The largest chamber had not been entered previous to 1903, when it was explored by Mr Furlong and the writer.

¹ The explorations during the season of 1905 were carried on under an appropriation from the Archaeological Institute of America for the "Exploration of Caves in Northern California under the supervision of F. W. Putnam."

Opening into one of the passageways about 100 feet from the entrance is a fissure containing a small alluvial fan, which opens out on the floor of the chamber. This deposit appears to have accumulated through the entrance of material from the upper part of the fissure. The entrance is now closed with a stalagmite growth, and no clue to its position has yet been obtained from the study of the surface of the rock outside. In small pockets on the sides of the fissure, and in the deposit below, there have been found large numbers of bone fragments representing a Quaternary fauna. These include remains of extinct species¹ of *Equus*, *Elephas*, and *Ursus*; also remains of *Euceratherium*,² a recently described sheep-like ungulate found in these caves, and bones of a ground-sloth somewhat similar to forms found in the caves of Brazil.³

The largest chamber of the Samwel cave is at a lower level than the entrance and the fissure deposit. It was entered from above through a long chimney. In this chamber there was found a large deposit of fossil remains, including numerous extinct species. Among these were *Euceratherium*, *Preptoceras*⁴ (another new sheep-like form), and a ground-sloth. It seemed improbable that the remains in this lower chamber had come in through the passage by which we first obtained entrance, and a careful search revealed the presence of an alluvial fan coming in from one side of the cavern. Excavations into this indicated that it reached out toward the surface, and during the last season a passageway was cut through it to an outer grotto on the side of a small cañon near by. The lower chamber was originally reached by a passageway leading from a large shelter cave now represented by the grotto. A part of the roof of the original shelter has broken down, and is represented by several large blocks which have fallen from the cliff above.

In the Samwel cave numerous splintered and polished bone fragments have been obtained, and the problems with relation to man are practically the same as those of Potter Creek cave. In addition to these objects, there was found in the chamber near the fissure de-

¹ See E. L. Furlong in *Science*, n. s., vol. 20, p. 53.

² Sinclair and Furlong, *Univ. Calif. Publ., Geology*, vol. 3, no. 20.

³ Sinclair, *New Mammalia*, op. cit., p. 153.

⁴ E. L. Furlong, *Univ. Calif. Publ., Geology*, vol. 4, no. 8.

posit, a chipped fragment of basaltic lava, which appeared to have come from a point six inches below the surface of the stalagmite. Also in the excavation of the outer grotto of the largest chamber, a chipped obsidian fragment was brought up in the bucket from a depth of eleven feet, at which level bones resembling those of an extinct species have been obtained. In neither case, however, was the chipped fragment actually seen in place, and both must be set aside, for the present, as merely suggesting the presence of man.

STONE MAN CAVE

A third cavern in the Shasta region, which has been partly explored, is the Stone Man cave about one mile northeast of Baird. It was visited by Mr Furlong and the writer in 1903. In one of the uppermost chambers a number of bone fragments were found in the stalagmite. These were, however, too imperfect for specific determination, and the age of the deposit has not been determined. In one of the lower galleries, a portion of a human skeleton was found imbedded in the stalagmite. The greater number of the bones had been removed before our visit, but enough was left to show that a considerable fraction of an inch of stalagmite has accumulated on the skeleton. Mr J. A. Richardson kindly gave us a vertebra which he obtained here when the cave was first explored. It seems to have lost practically all of the organic matter, and the cavities in the bone are largely filled with calcite crystals. In this cave there is unfortunately nothing to fix the age of the skeleton definitely. It might easily be many centuries old, or might have come to its present location at a comparatively recent date, though evidence rather favors a considerable antiquity.

AGE OF THE CAVE DEPOSITS

The faunas of both the Potter Creek and the Samwel cave indicate Quaternary age. As far as is now known, the fauna of Samwel cave contains the larger percentage of recent species and is probably the younger. In addition to this evidence, the situation of the two caverns gives considerable information regarding their relative ages. Potter Creek cave is situated at a height of 800 feet above the level of McCloud river, and just below an ancient terrace level

of the river. The Samwel cave is situated just below a terrace 350 feet above the McCloud. The lowest chamber of this cave opens at a point not more than 200 feet above the river. Both caverns were evidently formed at a time when McCloud river was near the level of the terraces above them. Both received their principal deposits when the river was a short distance below them, and it is evident that the time which has elapsed since the formation of the deposits in Potter Creek cave is much greater than that since the formation of similar beds in the Samwel cave. The evidence of physiography apparently corroborates that obtained from the study of the fauna.

The fauna of Potter Creek cave is considered by Dr Sinclair to represent the middle or later Quaternary. The fauna of Samwel cave is certainly Quaternary, but is evidently later than that of Potter Creek. The age of Potter Creek cave is, according to commonly accepted correlations, not far from that of the earliest deposits containing human remains in Europe. Though a reasonable doubt might arise as to whether man could have reached America as early as the date of the Potter Creek deposits, the age of Samwel cave appears to be within the period of man's existence in the old world.

From the evidence at hand it seems that both Mercer's cave and Stone Man cave were in existence in Quaternary time, and in all probability some of the deposits in both caverns were formed in that period.

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